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Interactive comment on "Mid-to-late Holocene Temperature Evolution and Atmospheric Dynamics over Europe in Regional Model Simulations" *by* Emmanuele Russo and Ulrich Cubasch

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Mid-to-late Holocene Temperature Evolution and Atmospheric Dynamics over Europe in Regional Model Simulations

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Reply to
G. Strandberg
Mid-to-late Holocene Temperature Evolution and Atmospheric Dynamics over Europe in Regional Model Simulations by Russo, Emmanuele; Cubasch, Ulrich cp-2016-10

Dear G. Strandberg,
thank you very much for your interest in our paper.
We are very thankful to receive the comments of an expert in the field of paleoclimate and regional climate modelling. Below we try to answer to your remarks, and detail how we dealt with your concerns reported in *italic*.

Thank you.

Main Comments:

1. *I would like to draw the authors' attention to a study (Strandberg et al., 2014) that simulates 6k BP and 0.2k BP climate in Europe with a RCM. Although it only consists of two time slices I think it qualifies as "high resolution simulations for different time slices of mid-to-late Holocene performed over Europe using a Regional Climate Model" (perhaps the first such simulations). Furthermore, since Strandberg et al. (2014) use boundary data from ECHO-G and compare the results with the reconstructions from Mauri et al. (2014) it should be of interest for Russo and Cubash.*

   Thanks for suggesting the work of Strandberg et al. 2014. It is interesting and gave us the opportunity to consider new proxy-reconstructions for our discussion. Additionally, the paper structure, and in particular the paragraph on the comparison against other PMIP results, makes it a good reference to consider in order to further improve the first draft of our manuscript.

2. *I know that it is a characteristic of modellers to exaggerate the uncertainties in the models and downplay the uncertainties in the reconstructions, but I would be careful to "validate" the model against one set of reconstructions alone since they may be of equally good/poor quality as the model simulations. When considering astronomical forcing alone (see Fig. 2 in Wagner et al., 2007), we would expect 6k to be warmer than 0.2k and the temperature difference to be largest in summer in northern Europe. This is the signature we see in the model simulations of Strandberg et al. (2014). The non-pollen proxy based palaeoclimatic data presented in Strandberg et al. (2014) and the pollen based reconstruction of Peyron et al. (2013) rather support the differences in summer temperatures simulated by Strandberg et al. (2014) than the reconstruction of Mauri et al. (2014), in particular for southern and eastern Europe.*

   The choice of the dataset of Mauri et al. 2014 has been done for many rea-

   sons. First of all it allows to perform a comparison with model results over most of the simulations domain, considering different variables (even if we only focus on temperature in our discussion). Then, it covers exactly the same time-slices of the model simulations. No other dataset has this temporal and spatial coverage. Additionally, the robustness of the data has been already tested, in Mauri et al. 2014, against other proxies (including chironomids, δ^{18}O from speleothems and lake ostracods, bog-oaks, glacio-lacustrine sediments, wood anatomy and other pollen reconstructions based on different reconstruction methods). For such reasons we think that the reconstructions of Mauri et al. 2014 are a reliable source for the comparison of model results.
   Nevertheless, considering other proxies for our analyses could be an important point. Preliminary qualitative analysis against other reconstructions, such as the ones of Hairi et al. 2014 and Peyron et al. 2013, confirm that the data used in our discussion present a similar behaviour. In our former analysis this was not evident since we considered regional means for the investigation of mid-to-late Holocene temperature evolution. For this reason, we now performed additional analysis accordingly to this point.

With kind regards on behalf of the all authors,
Emmanuele Russo